

App. No. 10/718,961

Reply to Office Action of January 18, 2006

REMARKS/ARGUMENTS**A. Summary of the Amendment**

Reexamination and reconsideration are courteously requested. By way of the present amendment, claims 1, 9, and 20 are amended to include the features of dependent claims 8, 16, and 23, respectively. Claims 8, 16, and 21 to 23 are canceled. No claims are added, and no claims have been withdrawn as the result of a restriction requirement. Thus, claims 1 to 7, 9 to 15, 17 to 20, and 24 remain pending for the Examiner's consideration, with claims 1, 9, and 20 being independent claims.

By way of the current amendment, claims 1, 9, and 20 are amended to include the features of dependent claims 8, 16, and 23, respectively. Thus, no new issues are raised by the present amendment, and no claims are added. Further, a typographical error in claim 9 is corrected, thus placing the claims in better form.

B. Rejections Under 35 U.S.C. § 102(b)

Claims 20 to 21, and 24 are rejected as being anticipated by U.S. Patent No. 5,322,666 (Watwe). These rejections are moot since the present amendment incorporates the features of claim 23 into independent claim 20. The rejection of claim 22 under 35 U.S.C. § 103(a) based on Watwe is also moot for the same reason.

C. Rejections Under 35 U.S.C. § 103(a)

Claims 1 to 24 are rejected as being unpatentable over U.S. Patent No. 5,745,834 (Bampton) in view of U.S. Patent No. 3,950,166 (Obara) and U.S. Patent No. 5,640,667 (Frietag). These rejections are respectfully traversed.

Claims 1 and 9 recite that during a selective laser sintering method, a powder blend includes a titanium-including base metal having a first melting temperature, and an alloying

App. No. 10/718,961

Reply to Office Action of January 18, 2006

metal that has a second melting temperature. By way of the present amendment, these claims also recite that the powder blend does not include a carbon based polymer. This feature is significant because it establishes just how the claims introduce a new way to bind titanium-including metals.

In conventional selective laser sintering processes, there are two main ways to bind titanium-including metals, both of which are different from that of the presently-claimed invention. The first conventional method includes heating the titanium metal or alloy to its melting temperature, causing the metal to form a solid layer when it cools. The second conventional method includes adding to the metal a carbon-based polymer binder, such as vinyl, which readily melts and captures the titanium metals or alloys. In contrast, the present invention uses a low melting temperature metal in place of a polymer binder to dissolve the titanium metal or alloy and capture it upon re-solidification.

The cited prior art fails to disclose a powder blend having the composition defined in the independent claims. More particularly, the prior art fails to teach or suggest a titanium-including base metal, a lower melting point metal, and an absence of carbon based polymer. In the Office Action, the Examiner asserts that Bampton, at col. 2 lines 37-41, suggests that a polymer binder is not necessary when a simple shape is being constructed using selective laser sintering. Such a characterization of Bampton is simply inaccurate. Every single powder blend disclosed by Bampton for selective sintering processes includes polymer binders. The overall process Bampton discloses is taught as being advantageous when building complex components, but that teaching in no way implies that polymer binders are unnecessary when building simpler shapes - it simply leads one to appreciate that the process is suitable for building both simple and complex shapes. Furthermore, Bampton does not attribute the advantage of being able to adequately build complex shapes solely to the binder. In fact, Bampton clearly teaches (in the same passage cited by the Examiner) to the contrary, that the binder alone does not solve the problem of additional supports that are necessary when building with a polymer-containing powder blend. Thus, a person of ordinary skill in the art would in no way be motivated by the teachings of Bampton to remove a polymer binder from the powder blend during any type of selective laser sintering process. Consequently, a person of such skill

App. No. 10/718,961

Reply to Office Action of January 18, 2006

would not be motivated to modify Bampton and arrive at the presently-claimed invention from reviewing Bampton.

Further, the Examiner asserts that Freitag discloses a selective laser sintering process in which metal powders are bound without the use of a polymer binder. However, Freitag is directed to a method like the first conventional prior art method discussed above in which the base metal itself is heated and bound upon cooling. Freitag does not use a polymeric or metal binder, but instead laser sinters the base powder first at a low energy "in a manner as to bind the particles of powder ..., but not to such an extent as to form a fully-dense metal portion thereat" (col. 6, lines 55 to 58). Then, Freitag performs selective laser sintering at the periphery of the bound metal to form a skin that maintains the component shape during a subsequent global heating process (col. 7, lines 20 to 52). Because the Freitag disclosure is entirely void of a discussion involving binders for alloying titanium-based metals, a person of ordinary skill in the art would not be motivated by reviewing Freitag to use as a binder "an alloying metal having a second melting temperature lower than said first melting temperature" in place of a polymer binder, particularly when the base metal is a titanium-containing metal.

Finally, claim 20 recites a powder blend including 1) a base metal of titanium or alloy thereof, the base metal having a first melting temperature; and 2) an alloying metal having a second melting temperature lower than the first melting temperature, and including a Ti-Cu-Ni alloy at a concentration ranging between about 10 wt.% and about 30 wt.%, said Ti-Cu-Ni alloy being about 15% Ni and about 15% Cu, with the balance being Ti. None of the prior art references teaches or suggests such a powder blend. The closest reference is perhaps Obara since Cu, and Ni are discussed as potential additives to a titanium-based powder. However, nowhere in Obara is there a teaching or suggestion that the powder mixture include powders of a titanium alloy, and specifically the titanium alloy recited in claim 20.

App. No. 10/718,961

Reply to Office Action of January 18, 2006

D. Conclusion

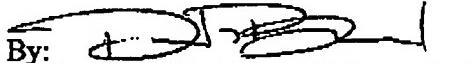
In view of Applicant's amendments and remarks, it is respectfully submitted that Examiner's objections and rejections have been overcome. Accordingly, Applicants respectfully submit that the application is now in condition for allowance, and such allowance is therefore earnestly requested. Should the Examiner have any questions or wish to further discuss this application, Applicants request that the Examiner contact the Applicants attorneys at the below-listed telephone number.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent abandonment on this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

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By: 

David K. Benson
Reg. No. 42,314
(480) 385-5060